CLAIMS:

The invention claimed is:

1. An atomic layer deposition method of forming an oxide comprising layer on a substrate, comprising:

positioning a substrate within a deposition chamber;

chemisorbing a first species to form a first species monolayer onto the substrate within the deposition chamber from a gaseous first precursor;

contacting the chemisorbed first species with a gaseous second precursor effective to react with the first species to form an oxide of a component of the first species monolayer, the contacting at least in part resulting from flowing O_3 to the deposition chamber, the O_3 being at a temperature of at least 170°C at a location where it is emitted into the deposition chamber; and

successively repeating the chemisorbing and the contacting to form an oxide comprising layer on the substrate.

2. The method of claim 1 wherein the O_3 is at a temperature of at least 200°C at the location where it is emitted into the deposition chamber.

3. The method of claim 1 wherein the O_3 is at a temperature of at least 300°C at the location where it is emitted into the deposition chamber.

4. The method of claim 1 wherein the O_3 is at a temperature of at least 350°C at the location where it is emitted into the deposition chamber.

5. The method of claim 1 wherein the O_3 is at a temperature of no greater than 600°C at the location where it is emitted into the deposition chamber.

6. The method of claim 1 wherein the substrate is positioned on a substrate heater, the substrate heater being at a temperature of at least 350°C during the contacting.

7. The method of claim 1 wherein the substrate is positioned on a substrate heater, the substrate heater being at a temperature of at least 400°C during the contacting.

8. The method of claim 1 wherein the deposition chamber comprises a lid heat source, the contacting occurring while the lid heat source is heated to a temperature of at least 300°C.

9. The method of claim 1 wherein the deposition chamber comprises a lid heat source, the contacting occurring while the lid heat source is heated to a temperature of at least 350°C.

10. The method of claim 1 wherein,

the deposition chamber comprises a lid heat source, the contacting occurring while the lid heat source is heated to a temperature of at least 350°C; and

the substrate is positioned on a substrate heater, the substrate heater being at a temperature of at least 350°C during the contacting.

11. The method of claim 1 wherein the deposition chamber comprises a lid heat source, the contacting occurring while the lid heat source is heated to a temperature of at least 430°C.

12. The method of claim 11 wherein the substrate is positioned on a substrate heater, the substrate heater being at a temperature of at least 430°C during the contacting.

13. The method of claim 1 wherein the gaseous first precursor comprises a metal organic.

14. The method of claim 1 wherein the O_3 forms O* proximate the substrate which reacts with the chemisorbed first species to form the oxide.

15. The method of claim 1 wherein the first species monolayer is at a temperature during the contacting, the O_3 being at a temperature at the location where it is emitted into the deposition chamber which is greater than the first species monolayer temperature during the contacting.

16. The method of claim 1 wherein the O_3 is at a temperature of at least 200°C at the location where it is emitted into the deposition chamber, the O_3 forming O* proximate the substrate which reacts with the chemisorbed first species to form the oxide.

17. The method of claim 16 wherein the first species monolayer is at a temperature during the contacting, the O_3 being at a temperature at the location where it is emitted into the deposition chamber which is greater than the first species monolayer temperature during the contacting.

18. The method of claim 1 wherein the O_3 is at a temperature of at least 300°C at the location where it is emitted into the deposition chamber, the O_3 forming O* proximate the substrate which reacts with the chemisorbed first species to form the oxide.

19. The method of claim 18 wherein the first species monolayer is at a temperature during the contacting, the O_3 being at a temperature at the location where it is emitted into the deposition chamber which is greater than the first species monolayer temperature during the contacting.

20. The method of claim 1 wherein the contacting at least in part results from flowing a mixture of O_2 and O_3 to the deposition chamber.

21. The method of claim 1 wherein the O_3 is flowed to the chamber from a conduit, the conduit being void of any external heat source at a location from where it enters the chamber to no greater than one foot upstream.

22. An atomic layer deposition method of forming an aluminum oxide comprising layer on a substrate, comprising:

positioning a substrate within a deposition chamber;

chemisorbing an aluminum comprising first species to form a first species monolayer onto the substrate within the deposition chamber from a gaseous first precursor comprising trimethyl aluminum;

contacting the chemisorbed first species with a gaseous second precursor effective to react with the first species to form aluminum oxide from the first species monolayer, the contacting at least in part resulting from flowing a mixture of O_2 and O_3 to the deposition chamber, the O_2 and O_3 mixture being at a temperature of at least 170°C at a location where it is emitted into the deposition chamber; and

successively repeating the chemisorbing and the contacting to form an aluminum oxide comprising layer on the substrate.

23. The method of claim 22 wherein the O_3 is at a temperature of at least 200°C at the location where it is emitted into the deposition chamber.

24. The method of claim 22 wherein the O_3 is at a temperature of at least 300°C at the location where it is emitted into the deposition chamber.

25. The method of claim 22 wherein the O_3 is at a temperature of at least 350°C at the location where it is emitted into the deposition chamber.

26. The method of claim 22 wherein the O_3 is at a temperature of no greater than 600°C at the location where it is emitted into the deposition chamber.

27. The method of claim 22 wherein the substrate is positioned on a substrate heater, the substrate heater being at a temperature of at least 350°C during the contacting.

28. The method of claim 22 wherein the substrate is positioned on a substrate heater, the substrate heater being at a temperature of at least 400°C during the contacting.

29. The method of claim 22 wherein the deposition chamber comprises a lid heat source, the contacting occurring while the lid heat source is heated to a temperature of at least 300°C.

30. The method of claim 22 wherein the deposition chamber comprises a lid heat source, the contacting occurring while the lid heat source is heated to a temperature of at least 350°C.

31. The method of claim 22 wherein,

the deposition chamber comprises a lid heat source, the contacting occurring while the lid heat source is heated to a temperature of at least 350°C; and

the substrate is positioned on a substrate heater, the substrate heater being at a temperature of at least 350°C during the contacting.

32. The method of claim 22 wherein the deposition chamber comprises a lid heat source, the contacting occurring while the lid heat source is heated to a temperature of at least 400°C.

33. The method of claim 22 wherein the deposition chamber comprises a lid heat source, the contacting occurring while the lid heat source is heated to a temperature of at least 430°C.

34. The method of claim 33 wherein the substrate is positioned on a substrate heater, the substrate heater being at a temperature of at least 430°C during the contacting.

35. The method of claim 22 wherein the O_3 forms O* proximate the substrate which reacts with the chemisorbed first species to form the oxide.

36. The method of claim 22 wherein the first species monolayer is at a temperature during the contacting, the O_3 being at a temperature at the location where it is emitted into the deposition chamber which is greater than the first species monolayer temperature during the contacting.

37. The method of claim 22 wherein the O_3 is at a temperature of at least 200°C at the location where it is emitted into the deposition chamber, the O_3 forming O* proximate the substrate which reacts with the chemisorbed first species to form the oxide.

38. The method of claim 37 wherein the first species monolayer is at a temperature during the contacting, the O_3 being at a temperature at the location where it is emitted into the deposition chamber which is greater than the first species monolayer temperature during the contacting.

39. The method of claim 22 wherein the O_3 is at a temperature of at least 300°C at the location where it is emitted into the deposition chamber, the O_3 forming O* proximate the substrate which reacts with the chemisorbed first species to form the oxide.

40. The method of claim 39 wherein the first species monolayer is at a temperature during the contacting, the O_3 being at a temperature at the location where it is emitted into the deposition chamber which is greater than the first species monolayer temperature during the contacting.

41. The method of claim 22 wherein the O_3 is flowed to the chamber from a conduit, the conduit being void of any external heat source at a location from where it enters the chamber to no greater than one foot upstream.

42. An atomic layer deposition method of forming an oxide comprising layer on a substrate, comprising:

positioning a substrate within a deposition chamber;

chemisorbing a first species to form a first species monolayer onto the substrate within the deposition chamber from a gaseous first precursor;

contacting the chemisorbed first species with a gaseous second precursor effective to react with the first species to form an oxide of a component of the first species monolayer, the contacting at least in part resulting from flowing O_3 to the deposition chamber, the O_3 forming O* proximate the substrate which reacts with the chemisorbed first species to form the oxide, the O* proximate the substrate being at a temperature which is greater than that of the first species monolayer on the substrate; and

successively repeating the chemisorbing and the contacting to form an oxide comprising layer on the substrate.

43. The method of claim 42 wherein the O* proximate the substrate is at a temperature which is at least 25°C greater than that of the first species monolayer on the substrate.

44. The method of claim 42 wherein the O* proximate the substrate is at a temperature which is at least 50°C greater than that of the first species monolayer on the substrate.

45. The method of claim 42 wherein the O* proximate the substrate is at a temperature which is at least 75°C greater than that of the first species monolayer on the substrate.

46. The method of claim 42 wherein the O* proximate the substrate is at a temperature which is at least 100°C greater than that of the first species monolayer on the substrate.

47. The method of claim 42 wherein the O* proximate the substrate is at a temperature which is from 25°C to 150°C greater than that of the first species monolayer on the substrate.

48. The method of claim 42 wherein the deposition chamber comprises a lid heat source, the contacting occurring while the lid heat source is heated to a temperature of at least 300°C.

49. The method of claim 42 wherein the deposition chamber comprises a lid heat source, the contacting occurring while the lid heat source is heated to a temperature of at least 400°C.

50. The method of claim 42 wherein the contacting at least in part results from flowing a mixture of O_2 and O_3 to the deposition chamber.

51. The method of claim 42 wherein the gaseous first precursor comprises trimethyl aluminum, and the oxide comprises aluminum oxide.

52. The method of claim 42 wherein the O_3 is at a temperature of at least 170°C at a location where it is emitted into the deposition chamber.

53. An atomic layer deposition method of forming an oxide comprising layer on a substrate, comprising:

positioning a substrate within a deposition chamber, the deposition chamber comprising a substrate heater and at least one chamber wall heater;

chemisorbing a first species to form a first species monolayer onto the substrate within the deposition chamber from a gaseous first precursor;

contacting the chemisorbed first species with a gaseous second precursor effective to react with the first species to form an oxide of a component of the first species monolayer, the contacting at least in part resulting from flowing O_3 to the deposition chamber, the substrate heater being at a temperature of at least 350°C and the at least one wall heater being at a temperature of at least 350°C during the contacting; and

successively repeating the chemisorbing and the contacting to form an oxide comprising layer on the substrate.

54. The method of claim 53 wherein the substrate heater is at a temperature of at least 400°C and the at least one wall heater being at a temperature of at least 400°C during the contacting.

55. The method of claim 53 wherein the substrate heater is at a temperature of at least 430°C and the at least one wall heater being at a temperature of at least 430°C during the contacting.

56. The method of claim 53 wherein the at least one wall heater comprises a lid heated to at least 350°C.

57. The method of claim 53 wherein the O_3 is at a temperature of at least 170°C at a location where it is emitted into the deposition chamber.